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      The Governors of the University of Alberta

<120> New Process

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<170> FastSEQ for Windows Version 3.0

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<213> Streptomyces clavuligerus

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          <213> Streptomyces clavuligerus

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Glu Glu Ile Ala Gln Ala Ala Ala Glu Gln Met Arg Thr Leu Gly His
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Phe His Thr Trp Gly Thr Ile Ser Asn Asp Lys Ala Ile Arg Leu Ala
65                  70                  75                  80
Ala Arg Leu Thr Asp Leu Ala Pro Gln Gly Leu Gln Arg Val Tyr Phe
                85                  90                  95
Thr Ser Gly Gly Gly Glu Gly Val Glu Ile Ala Leu Arg Met Ala Arg
            100                 105                 110
Tyr Phe His His Arg Thr Gly Ser Pro Glu Arg Thr Trp Ile Leu Ser
        115                 120                 125
Arg Arg Thr Ala Tyr His Gly Ile Gly Tyr Gly Ser Gly Thr Val Ser
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Gly Ser Pro Ala Tyr Gln Asp Gly Phe Gly Pro Val Leu Pro His Val
145                 150                 155                 160
His His Leu Thr Pro Pro Asp Pro Tyr His Ala Glu Leu Tyr Asp Gly
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Glu Asp Val Thr Glu Tyr Cys Leu Arg Glu Leu Ala Arg Thr Ile Asp
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Glu Ile Gly Pro Gly Arg Ile Ala Ala Met Ile Gly Glu Pro Val Met
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Gly Ala Gly Gly Ala Val Val Pro Pro Asp Tyr Trp Pro Arg Val
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Ala Ala Leu Leu Arg Ser His Gly Ile Leu Leu Ile Leu Asp Glu Val
225                 230                 235                 240
Val Thr Ala Phe Gly Arg Thr Gly Thr Trp Phe Ala Ala Glu His Phe
                245                 250                 255
Gly Val Thr Pro Asp Leu Leu Val Thr Ala Lys Gly Ile Thr Ser Gly
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Tyr Val Pro His Gly Ala Val Leu Leu Thr Glu Glu Val Ala Asp Ala
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Glu Gly Leu Leu Glu Asn Ala Val Lys Val Gly Asp His Leu Ala Gly
                325                 330                 335
Arg Leu Ala Ala Leu Arg Gly Leu Pro Ala Val Gly Asp Val Arg Gln
                340                 345                 350
Leu Gly Met Met Leu Ala Val Glu Leu Val Ser Asp Lys Thr Ala Arg
                355                 360                 365
Thr Pro Leu Pro Gly Gly Thr Leu Gly Val Val Asp Ala Leu Arg Glu
        370                 375                 380
Asp Ala Gly Val Ile Val Arg Ala Thr Pro Arg Ser Leu Val Leu Asn
385                 390                 395                 400
Pro Ala Leu Val Met Asp Arg Ala Thr Ala Asp Glu Val Ala Asp Gly
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Ala Pro Arg Arg Gly
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        <213> Streptomyces clavuligerus

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            35                  40                  45
Ala Leu Leu Leu Ile Asn Ala Gly Ser Val Val Pro Val Asp Ser Ile
        50                  55                  60
Val Phe Arg Ile Trp Gly Asn Ser Pro Pro Gly Ala Val Thr Ala Thr
65                  70                  75                  80
Leu Gln Ser Tyr Val Ser Arg Leu Arg Lys Leu Leu Ala Glu Cys Val
                85                  90                  95
Leu Pro Asp Gly Ser Thr Pro Glu Leu Leu His Gln Pro Pro Gly Tyr
            100                 105                 110
Thr Leu Ala Leu Gly Thr Glu His Ile Asp Ala Asn Arg Phe Glu Gln
        115                 120                 125
Ala Ile Arg Thr Gly Arg Arg Leu Ser Arg Glu Glu Gln His Gln Glu
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Ala Arg Ala Val Leu Cys Gln Ala Leu Leu Ser Trp Gly Gly Thr Pro
145                 150                 155                 160
Tyr Glu Glu Leu Ser Ala Tyr Asp Phe Ala Val Gln Glu Ala Asn Arg
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Leu Glu Gln Leu Arg Leu Gly Ala Val Glu Thr Trp Ala His Cys Cys
            180                 185                 190
Leu Arg Leu Gly Arg Asp Glu Glu Val Met Asp Gln Leu Lys Pro Glu
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Val Gln Arg Asn Pro Leu Arg Glu Arg Leu Ile Gly Gln Leu Met Gln
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Ala Gln Tyr Arg Leu Gly Cys Gln Ala Asp Ala Leu Arg Thr Tyr Glu
225                 230                 235                 240
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Glu Leu Ala Ala Leu His Ala Ala Ile Leu Arg Gln Asp Asn Gly Leu
            260                 265                 270
Asp Arg Val Val Pro Ala Ser Ala Pro Pro Ser Ala Gly Val Gly Arg
        275                 280                 285
Gly Ala Val Thr Val Ser Val Pro Ala Gln Arg Ser Arg Pro Leu Thr
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Leu Pro Pro Phe Val Gly Arg Gly Asp Glu Leu Arg Gly Leu Leu Glu
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625                     630                     635                 640
Ala Ala Val Ile Leu Gln Ser Thr Gly Ala Arg Arg Val Leu Leu Asn
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Ala Leu Asp Ala Arg Ala Thr Gly Glu Leu Ala Gly Gly Met Leu Gly
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Lys Ala Pro Asp Thr Leu Leu Val Arg Ala Leu His Glu Arg Ser Ala
    675                     680                     685
Gly Asn Pro Tyr Phe Leu Val Gln Leu Leu Arg Ser Leu Arg Gln Gly
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Leu Ala Ala Ala Trp Glu Thr Glu Ile Pro Asp Glu Leu Ala Gly Val
705                     710                     715                 720
Val Leu Gln Arg Leu Ser Ser Val Pro Pro Ala Val Arg Arg Val Leu
            725                     730                     735
Asp Ile Cys Ala Val Val Glu Arg Ser Cys Glu Arg Arg Val Ile Glu
            740                     745                     750
Thr Val Leu Arg His Glu Gly Ile Pro Leu Glu Asn Val Arg Thr Ala
            755                     760                     765
Val Arg Gly Gly Leu Leu Glu Glu Asp Pro Asp Asp Pro Gly Arg Leu
    770                     775                     780
Arg Phe Val His Pro Leu Val Arg Glu Ala Val Trp Asp Asp Leu Glu
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<213> Streptomyces clavuligerus
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        <213> Streptomyces clavuligerus


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        <210> 8
        <211> 456
        <212> DNA
        <213> Streptomyces clavuligerus


        <400> 8
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        <210> 9
        <211> 567
        <212> DNA
        <213> Streptomyces clavuligerus


        <400> 9
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        <210> 10
        <211> 987
        <212> DNA
        <213> Streptomyces clavuligerus

        <400> 10
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        <210> 11
        <211> 1185
        <212> DNA
        <213> Streptomyces clavuligerus

        <400> 11
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```

        <210> 12
        <211> 1668
        <212> DNA
        <213> Streptomyces clavuligerus

        <400> 12
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```

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        <210> 13
        <211> 1584
        <212> DNA
        <213> Streptomyces clavuligerus

        <400> 13
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```

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        <210> 14
        <211> 1056
        <212> DNA
        <213> Streptomyces clavuligerus

        <400> 14
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gacgaccacc acgtcatggc cgatcgggtc gggccggtgg cgcagccgca tgaaggtcgc    1020
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        `<210> 15`
        `<211> 1176`
        `<212> DNA`
        `<213> Streptomyces clavuligerus`

        `<400> 15`

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        `<210> 16`
        `<211> 13313`
        `<212> DNA`
        `<213> Streptomyces clavuligerus`

        `<400> 16`

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cggggagtcc gcccgtacct ggatactctc ccgccggccg gcctaccacg gcgtcggata   15300
cggcagcggc ggcgtcaccg gcttcccgc ctaccaccag ggcttcggcc cctccctccc    15360
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cgactactgg ccccgggtcg ccgagctgct gcactcctac ggcatcctgc tgatctccga   15600
cgaggtgatc acggggtacg ggcgcaccgg gcactggttc gccgccgacc acttcggcgt   15660
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ggccgagctg agcgatctgc cgatcgtcgg ggacgtccgg cagaccggtc tgatgctcgg   15960
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gcgcctgtcc gacttcggca tctccatgcg caagggcgag ccccggctga ccgagaccaa   17640
ctatgtcgtg ggtacgcccg gttacttcgc ccccgagcag gtcgagggcg cggagccgga   17700
cttccccgcc gatctcttcg ccgtcggcct ggtcggcctc tatctgctgg agggtcagaa   17760
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ggggataccg gagccgctgt ggcaggtgct cgcggggctg atccagcccg accccgccgc   17880
ccggttccgt acggcgacgg gggcccggaa ggccctcgcc gccgccgtgg aactgcttcc   17940
cgagagcggc cccgacgacg aaccggtgga gatattcgac caactgggcc cgctgccgcc   18000
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ctccggtacc                                                          18070
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<210> 18
<211> 1668
<212> DNA
<213> Streptomyces clavuligerus

<400> 18

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atggccacca cgaccgcgaa agccatgctg gaacgtcttc accagtacgg tgtcgaccat    60
gtattcggcg tcgtcggccg ggaggcgtcc gccattctct tcgacgaggt cgaaggactc   120
gacttcgtcc tgacccggca cgagttcacc gccggggtga tggcggacgt cctcgcccgg   180
atcaccaacc gcccccaggc gtgcttcgcg accctgggcc ccggcatgac caacctggcc   240
accggcgtcg ccacctccgc cctggaccgc agctcggtca tcgcgctggc cgcgcagtcc   300
gagtcgtacg actgctaccc caacgtcacc caccagtgcc tggacagcac cgccgtgatg   360
ggcccgctga ccaagttcag cgtccagctc gaacgcggcg aggacatcgt caacctcgtc   420
gacagcgccg tcctcaacag ccggatcgag cccgtgggtc ccagcttcat cagcctgccg   480
gtcgacctcc tcggcgccga gctgaacggc accccaccg acgcccccct ggtccgggcc   540
accgccaccc acgccctgga cgccgactgg cgcgcccgcc tcgacgaggc cgctgagctg   600
gtgcgcgagg ccgagaaccc cctcctcgtc gtcggtagcg ccgtcatccg cgccggggcc   660
gtcgacgccc cgcgcgagcc cgccgagcgg ctgaacatcc ccgtcgtcac cacctacacc   720
gccaaggcg tcctgccgca cgaccacccg ctcaactacg cgccatcag cggctacatg   780
gacggcattc tcggccaccc ggccctcgac gagatcttcg gccccgccga cctcctcctg   840
gcgatcggct acgactacgc cgaggacctg cgcccctcca tgtggacgcg gggccgggcc   900
aagaccacgg tccgggtcgc ccccgaggtc aacccgatcc cggagctgtt ccgcgccgac   960
atcgacatcg tcaccaacgt cgccgaattc gtcaccgcgc tcgacgacgc gacctcgggc  1020
ctcgccccca agacccggca cgacctcagc gccctgcgcg cccgcgtcgc cgaattcctc  1080
```

```
gccgacccca ccgagtacga ggacggcatg cgggtccacc aggtgatcga ctgcatgaac   1140
tccgtcctcg acaacggcac cttcgtcagc gacatcggct tcttccgcca ctacggcgtg   1200
ctcttcgcca agtccgacca gccgtacgga ttcctcacct ccgcgggctg ctccagcttc   1260
ggctacggac tgcccgccgc catggccgcc cagatcgccc ggcccggcga gcccgtcttc   1320
ctcatcgcgg cgacggcgg cttccactcc aacagcgccg acatcgagac ggccgtgcgc     1380
ctgggcctgc cgatcgtcat ggtcgtcgtc aacaacgacc gcaacggcct gatcgagctg   1440
taccagaacc tcggacacca gcgctcccac gcccccgccg tcggcttcgg aagcgtcgac   1500
ttcgtccagc tcgccgaggc caacggctgc gaggccgtcc gcgccaccga ccgcacctcg   1560
ctgctcgccg ccctcaccaa gggcgccgga ctcggccgcc cgttcctgat cgaggtaccg   1620
gtggcctacg acttccagtc cggcggtttc gccgccctgg ccatctga               1668
```

          <210> 19
          <211> 1583
          <212> DNA
          <213> Streptomyces clavuligerus

          <400> 19
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atgcccggcc ccgacctcgt gtacggattc cgggtgcgca tcggcaccga gggccgcccc    60
ggcggcggcc ccggcggtca ctccgaaccc ggcagcgcac cccgcttcgc cgtccgcggg   120
acccatgtcc ccgtgcacga cggcaccgcg tacccgctct ggagcggaac ggccgtgacc   180
ctgggccgtc cgcccgtcct ggtcgccgac ggccaggtcc ggctgctcct ggcgggcgag   240
ctgtacaacc gcgccgagct gaccggagcg ctcggcggct cctctgccgc cctcggcgac   300
gccgaactgc tgctggccgc ctggcggcgc tggggccccg gggccttccg gctcctgaac   360
ggacggttcg ccgcactgct caccgacgcc tccaccggcg cgaccgtcgc ggccaccgac   420
cacgccggtt cggtaccgct gtggctgcgc gccgacgtga cggggctgag cgccgccacc   480
gaggcgaaga ccctggcgca cgagccgggc cggccgctgg gcctgtccgg cacccacacc   540
cgccggggggc ggcgggcgtc tgccgggtcc ccgccgggac cgccctcctg ctgcacggag   600
tcggcggctc cgacatcacc gccagggcgg tccgcacctg gacacccccg ctctcccggg   660
cgctgcccgg cgaacgggag gcggtggacc tggtcggcga acgcctcgcc acggcggtcc   720
gcaccggct gcgcggcggg gaggcggccc ccaccgtcgt cctgtccggc ggcatcgact   780
ccggggggagt cgccgcccac acggcggccc tggcacccgg gacacggtcc gtgtcgatgg   840
gcaccgaggt gtccgacgag ttcgacgcgg cccgctcggt cgccgtccac ctgggcaccg   900
cgcacagcga gatccggctc cactcggccg aactcgtcag ggaactgccc tgggcggtcg   960
ccgccgcgga gatcaccgac cccacggtcc tggagtacct gctgccgctc gtcgccctct   1020
accggcggct cgacaccggg ccgtccgca tcctcaccgg gtacggcgcc gacatcccgc   1080
tcggcggtat gcaccggcgc acggcctcgc tctggtccct cgacgacgag atcgcgggcg   1140
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agtggaccac ccacccgtac tgggaccgcg cggtcctgga cgcgctggtc tccctcgaac   1260
ccgggctcaa acgccggcgg ggcaccgaca agtgggtgtt gcggcaggcc ctctccggcc   1320
tgctgcccgc cgagaccgtg gcccgcccca agctgggcat ccacgagggg tccggcacca   1380
ccagcgcgtg gaccggactg ctcctcgccg aagggatccg gcgcgacgag gtgacggccg   1440
tcaagggcgc catggcacgg cgcctgtacg acgcggtggt catcgacacg gtgccgccgg   1500
aggacgtgga cttcggcgag acggtgcggc gctccgtcga cgcggtgcgc aggctcaggc   1560
tccagggccg ggtggtcgta tga                                           1583
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          <210> 20
          <211> 1056
          <212> DNA
          <213> Streptomyces clavuligerus

          <400> 20
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cggcccgacc cgatcggcca tgacgtggtg gtcgtcggcg ccccgtacga cggaggcacc   120
agctaccggc ccggcgcgcg gttcgcgccg cgcgccatcc ggcacgagtc cagcctgatc   180
cacggcgtcg gcatcgaccg gggcccaggg gtcttcgacc ggatcgacgt ggtcgacggg   240
ggcgacatcg acctcagccc cttctcgatg gacctggcga tggacaccgc gacggtcgcc   300
ctgacccggc tcctggaacg caacgacgcg ttcctgatgc tgggcgggga ccactcgctc   360
tccctggccg ccctgcgcgc cgtgcacgcc cgccacggcc gggtcgccgt cctgcacctg   420
gacgcgcaca gcgacaccaa cccacccgtc tacggcggca cctaccacca cggcaccccc   480
ttccgctggg ccatcgaaga gggcctggtg gacccggagc gcctggtcca ggtcggcatc   540
cgcggccaca atcccggccc cgactccctg gactacgcgc gcgggcacgg cgtcagcatc   600
gtcaccgccg ccgacttcac ccggcgctca ccgcgcgagca tcgccggagca gatccggcgc   660
accgtcggcg gcctgccgct gtacgtctcc gtcgacatcg acgtcgtcga cccggcgtac   720
gccccgggca ccggcacacc ggccccggc gggctgtcct cgcgcgaggt gctgaccctg   780
ctcgacgtgg tcgggcagct caggcccgtc ggcttcgacg tggtcgaggt gtccccggcg   840
tacgacccgt cggggatcac ctccctgctg gcggcggaga tcggggccga actgctctac   900
cagtacgccc gcgccaccac gtcgcccgcg tcggcaccgg tggactctcc cctgccaccg   960
ggggcggcgg cggacgacgc cgagaacgcc gagaacgcgg tggacgcggt ggacgccgag   1020
```

agcgccgtgg acttcgccgg gcagcggtgg gggtag   1056

        <210> 21
        <211> 441
        <212> PRT
        <213> Streptomyces clavuligerus

        <400> 21

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Val Pro Gly Ser Gly Leu Glu Ala Leu Asp Arg Ala Thr Leu Ile His
1               5                   10                  15
Pro Thr Leu Ser Gly Asn Thr Ala Glu Arg Ile Val Leu Thr Ser Gly
            20                  25                  30
Ser Gly Ser Arg Val Arg Asp Thr Asp Gly Arg Glu Tyr Leu Asp Ala
        35                  40                  45
Ser Ala Val Leu Gly Val Thr Gln Val Gly His Gly Arg Ala Glu Leu
    50                  55                  60
Ala Arg Val Ala Ala Glu Gln Met Ala Arg Leu Glu Tyr Phe His Thr
65                  70                  75                  80
Trp Gly Thr Ile Ser Asn Asp Arg Ala Val Glu Leu Ala Ala Arg Leu
                85                  90                  95
Val Gly Leu Ser Pro Glu Pro Leu Thr Arg Val Tyr Phe Thr Ser Gly
            100                 105                 110
Gly Ala Glu Gly Asn Glu Ile Ala Leu Arg Met Ala Arg Leu Tyr His
        115                 120                 125
His Arg Arg Gly Glu Ser Ala Arg Thr Trp Ile Leu Ser Arg Arg Ser
    130                 135                 140
Ala Tyr His Gly Val Gly Tyr Gly Ser Gly Gly Val Thr Gly Phe Pro
145                 150                 155                 160
Ala Tyr His Gln Gly Phe Gly Pro Ser Leu Pro Asp Val Asp Phe Leu
                165                 170                 175
Thr Pro Pro Gln Pro Tyr Arg Arg Glu Leu Phe Ala Gly Ser Asp Val
            180                 185                 190
Thr Asp Phe Cys Leu Ala Glu Leu Arg Glu Thr Ile Asp Arg Ile Gly
        195                 200                 205
Pro Glu Arg Ile Ala Ala Met Ile Gly Glu Pro Ile Met Gly Ala Val
    210                 215                 220
Gly Ala Ala Ala Pro Pro Ala Asp Tyr Trp Pro Arg Val Ala Glu Leu
225                 230                 235                 240
Leu His Ser Tyr Gly Ile Leu Leu Ile Ser Asp Glu Val Ile Thr Gly
                245                 250                 255
Tyr Gly Arg Thr Gly His Trp Phe Ala Ala Asp His Phe Gly Val Val
            260                 265                 270
Pro Asp Ile Met Val Thr Ala Lys Gly Ile Thr Ser Gly Tyr Val Pro
        275                 280                 285
His Gly Ala Val Leu Thr Thr Glu Ala Val Ala Asp Glu Val Val Gly
    290                 295                 300
Asp Gln Gly Phe Pro Ala Gly Phe Thr Tyr Ser Gly His Ala Thr Ala
305                 310                 315                 320
Cys Ala Val Ala Leu Ala Asn Leu Asp Ile Ile Glu Arg Glu Asn Leu
                325                 330                 335
Leu Asp Asn Ala Ser Thr Val Gly Ala Tyr Leu Gly Lys Arg Leu Ala
            340                 345                 350
Glu Leu Ser Asp Leu Pro Ile Val Gly Asp Val Arg Gln Thr Gly Leu
        355                 360                 365
Met Leu Gly Val Glu Leu Val Ala Arg Gly Thr Arg Glu Pro Leu Pro
    370                 375                 380
Gly Ala Ala Val Ala Glu Ala Leu Arg Glu Arg Ala Gly Ile Leu Leu
385                 390                 395                 400
Arg Ala Asn Gly Asn Ala Leu Ile Val Asn Pro Pro Leu Ile Phe Thr
                405                 410                 415
Gln Glu Asp Ala Asp Glu Leu Val Ala Gly Leu Arg Ser Val Leu Ala
            420                 425                 430
Arg Thr Arg Pro Asp Gly Arg Val Leu
        435                 440
```

        <210> 22
        <211> 188
        <212> PRT

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```
<213> Streptomyces clavuligerus

<400> 22
Val Thr Arg Pro Pro Gly Leu Ser Ala His Thr His Gly Ser Val Ser
1                5                  10                 15
Gly Ser Leu Leu Arg Arg Val Ala Gly His Tyr Pro Thr Gly Val Val
            20                  25                 30
Leu Val Thr Gly Pro Ala Glu Ala Pro Gly Gln Pro Pro Pro Ala Met
        35                  40                 45
Val Val Gly Thr Phe Thr Ser Val Ser Leu Asp Pro Val Leu Val Gly
    50                  55                 60
Phe Leu Pro Ala Arg Ser Ser Thr Thr Trp Pro Arg Leu Arg Ala Ala
65                  70                  75                 80
Gly Arg Phe Cys Val Asn Val Leu Gly Ala Asp Gln Gly Pro Val Cys
            85                  90                 95
Arg Ser Phe Ala Gly Gly Asp Pro Gly Arg Trp Glu Val Pro Tyr Arg
            100                 105                110
Thr Thr Ala Thr Gly Ser Pro Val Leu Leu Asp Ala Leu Ala Trp Phe
        115                 120                 125
Asp Cys Glu Val Ala Gly Glu Thr Glu Ala Gly Asp His Trp Phe Val
    130                 135                 140
Thr Gly Ala Val Arg Asp Leu Gly Val Ile Arg Glu Gly Ser Pro Leu
145                 150                 155                160
Val Phe Leu Arg Gly Asp Tyr Gly His Trp Ala Gly Gly Gly Gly Ser
            165                 170                 175
Gly Arg Ala Gly Arg Arg Ser Ala Val Cys Pro Val
            180                 185

<210> 23
<211> 391
<212> PRT
<213> Streptomyces clavuligerus

<400> 23
Met Arg Ala Ser Ser Pro Arg Gly Phe Arg Val His His Gly His Ala
1                5                  10                 15
Gly Ile Arg Gly Ser His Ala Asp Leu Ala Val Ile Ala Ser Asp Val
            20                  25                 30
Pro Ala Ala Val Gly Ala Val Phe Thr Arg Ser Arg Phe Ala Ala Pro
        35                  40                 45
Ser Val Leu Leu Ser Arg Asp Ala Val Ala Asp Gly Ile Ala Arg Gly
    50                  55                 60
Val Val Val Leu Ser Gly Asn Ala Asn Ala Gly Thr Gly Pro Arg Gly
65                  70                  75                 80
Tyr Glu Asp Ala Ala Glu Val Arg His Leu Val Ala Gly Ile Val Asp
            85                  90                 95
Cys Asp Glu Arg Asp Val Leu Ile Ala Ser Thr Gly Pro Val Gly Glu
            100                 105                110
Arg Tyr Pro Met Ser Arg Val Arg Ala His Leu Arg Ala Val Arg Gly
        115                 120                 125
Pro Leu Pro Gly Ala Asp Phe Asp Gly Ala Ala Ala Ala Val Leu Gly
    130                 135                 140
Thr Ala Gly Ala Arg Pro Thr Ile Arg Arg Ala Arg Cys Gly Asp Ala
145                 150                 155                160
Thr Leu Ile Gly Val Ala Lys Gly Pro Gly Thr Gly Pro Ala Glu Gln
            165                 170                 175
Asp Asp Arg Ser Thr Leu Ala Phe Phe Cys Thr Asp Ala Gln Val Ser
            180                 185                 190
Pro Val Val Leu Asp Asp Ile Phe Arg Arg Val Ala Asp Arg Ala Phe
        195                 200                 205
His Gly Leu Gly Phe Gly Ala Asp Ala Ser Thr Gly Asp Thr Ala Ala
    210                 215                 220
Val Leu Ala Asn Gly Leu Ala Gly Arg Val Asp Leu Val Ala Phe Glu
225                 230                 235                240
Gln Val Leu Gly Ala Leu Ala Leu Asp Leu Val Arg Asp Val Val Arg
            245                 250                 255
Asp Ser Gly Cys Gly Gly Ala Leu Val Thr Val Arg Val Thr Gly Ala
            260                 265                 270
```

```
His Asp Thr Glu Gln Ala Gly Arg Val Gly Arg Ala Val Val Asp Ala
    275                 280                 285
Pro Ser Leu Arg Ala Ala Val His Gly Pro Ala Pro Asp Trp Ala Pro
    290                 295                 300
Val Ala Ala Val Ala Gly Gly His Gly Asp Glu Gly Pro Gly Arg Ser
305                 310                 315                 320
Pro Gly Arg Ile Thr Ile Arg Val Gly Gly Arg Glu Val Phe Pro Ala
            325                 330                 335
Pro Arg Asp Arg Ala Arg Pro Asp Ala Val Thr Ala Tyr Pro His Gly
            340                 345                 350
Gly Glu Val Thr Val His Ile Asp Leu Gly Val Pro Gly Arg Ala Pro
        355                 360                 365
Gly Ala Phe Thr Val His Gly Cys Asp Leu Leu Ala Gly Tyr Pro Arg
    370                 375                 380
Leu Gly Ala Gly Arg Ala Val
385                 390
```

```
        <210> 24
        <211> 351
        <212> PRT
        <213> Streptomyces clavuligerus
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        <400> 24
Val Ser Thr Ala Val Ser Pro Arg Tyr Ala Gln Pro Ala Thr Phe Met
1               5               10                  15
Arg Leu Arg His Arg Pro Asp Pro Ile Gly His Asp Val Val Val Val
            20              25                  30
Gly Ala Pro Tyr Asp Gly Gly Thr Ser Tyr Arg Pro Gly Ala Arg Phe
        35              40                  45
Ala Pro Arg Ala Ile Arg His Glu Ser Ser Leu Ile His Gly Val Gly
    50              55                  60
Ile Asp Arg Gly Pro Gly Val Phe Asp Arg Ile Asp Val Val Asp Gly
65              70                  75                  80
Gly Asp Ile Asp Leu Ser Pro Phe Ser Met Asp Leu Ala Met Asp Thr
            85                  90                  95
Ala Thr Val Ala Leu Thr Arg Leu Leu Glu Arg Asn Asp Ala Phe Leu
        100                 105                 110
Met Leu Gly Gly Asp His Ser Leu Ser Leu Ala Ala Leu Arg Ala Val
    115                 120                 125
His Ala Arg His Gly Arg Val Ala Val Leu His Leu Asp Ala His Ser
    130                 135                 140
Asp Thr Asn Pro Pro Val Tyr Gly Gly Thr Tyr His His Gly Thr Pro
145                 150                 155                 160
Phe Arg Trp Ala Ile Glu Glu Gly Leu Val Asp Pro Glu Arg Leu Val
            165                 170                 175
Gln Val Gly Ile Arg Gly His Asn Pro Arg Pro Asp Ser Leu Asp Tyr
        180                 185                 190
Ala Arg Gly His Gly Val Ser Ile Val Thr Ala Ala Asp Phe Thr Arg
    195                 200                 205
Arg Ser Pro Arg Gly Ile Ala Glu Gln Ile Arg Arg Thr Val Gly Gly
    210                 215                 220
Leu Pro Leu Tyr Val Ser Val Asp Ile Asp Val Val Asp Pro Ala Tyr
225                 230                 235                 240
Ala Pro Gly Thr Gly Thr Pro Ala Pro Gly Gly Leu Ser Ser Arg Glu
            245                 250                 255
Val Leu Thr Leu Leu Asp Val Val Gly Gln Leu Arg Pro Val Gly Phe
        260                 265                 270
Asp Val Val Glu Val Ser Pro Ala Tyr Asp Pro Ser Gly Ile Thr Ser
    275                 280                 285
Leu Leu Ala Ala Glu Ile Gly Ala Glu Leu Leu Tyr Gln Tyr Ala Arg
    290                 295                 300
Ala Thr Thr Ser Pro Ala Ser Ala Pro Val Asp Ser Pro Leu Pro Pro
305                 310                 315                 320
Gly Ala Ala Ala Asp Asp Ala Glu Asn Ala Glu Asn Ala Val Asp Ala
            325                 330                 335
Val Asp Ala Glu Ser Ala Val Asp Phe Ala Gly Gln Arg Trp Gly
        340                 345                 350
```

```
<210> 25
<211> 527
<212> PRT
<213> Streptomyces clavuligerus

<400> 25
Met Pro Gly Pro Asp Leu Val Tyr Gly Phe Arg Val Arg Ile Gly Thr
1               5                   10                  15
Glu Gly Arg Pro Gly Gly Gly Pro Gly Gly His Ser Glu Pro Gly Ser
            20                  25                  30
Ala Pro Arg Phe Ala Val Arg Gly Thr His Val Pro Val His Asp Gly
        35                  40                  45
Thr Ala Tyr Pro Leu Trp Ser Gly Thr Ala Val Thr Leu Gly Arg Pro
    50                  55                  60
Pro Val Leu Val Ala Asp Gly Gln Val Arg Leu Leu Leu Ala Gly Glu
65                  70                  75                  80
Leu Tyr Asn Arg Ala Glu Leu Thr Gly Ala Leu Gly Gly Ser Ser Ala
                85                  90                  95
Ala Leu Gly Asp Ala Glu Leu Leu Leu Ala Ala Trp Arg Arg Trp Gly
            100                 105                 110
Pro Gly Ala Phe Arg Leu Leu Asn Gly Arg Phe Ala Ala Leu Leu Thr
        115                 120                 125
Asp Ala Ser Thr Gly Ala Thr Val Ala Ala Thr Asp His Ala Gly Ser
    130                 135                 140
Val Pro Leu Trp Leu Arg Ala Asp Val Thr Gly Leu Ser Ala Ala Thr
145                 150                 155                 160
Glu Ala Lys Thr Leu Ala His Glu Pro Gly Arg Pro Leu Gly Leu Ser
                165                 170                 175
Gly Thr His Thr Ala Pro Gly Ala Ala Gly Val Cys Arg Val Pro Ala
            180                 185                 190
Gly Thr Ala Leu Leu Leu His Gly Val Gly Gly Ser Asp Ile Thr Ala
        195                 200                 205
Arg Ala Val Arg Thr Trp Thr Pro Pro Leu Ser Arg Ala Leu Pro Gly
    210                 215                 220
Glu Arg Glu Ala Val Asp Leu Val Gly Glu Arg Leu Ala Thr Ala Val
225                 230                 235                 240
Arg Thr Arg Leu Arg Gly Gly Glu Ala Ala Pro Thr Val Val Leu Ser
                245                 250                 255
Gly Gly Ile Asp Ser Gly Gly Val Ala Ala His Thr Ala Ala Leu Ala
            260                 265                 270
Pro Gly Thr Arg Ser Val Ser Met Gly Thr Glu Val Ser Asp Glu Phe
        275                 280                 285
Asp Ala Ala Arg Ser Val Ala Val His Leu Gly Thr Ala His Ser Glu
    290                 295                 300
Ile Arg Leu His Ser Ala Glu Leu Val Arg Glu Leu Pro Trp Ala Val
305                 310                 315                 320
Ala Ala Ala Glu Ile Thr Asp Pro Thr Val Leu Glu Tyr Leu Leu Pro
                325                 330                 335
Leu Val Ala Leu Tyr Arg Arg Leu Asp Thr Gly Pro Leu Arg Ile Leu
            340                 345                 350
Thr Gly Tyr Gly Ala Asp Ile Pro Leu Gly Gly Met His Arg Arg Thr
        355                 360                 365
Ala Ser Leu Trp Ser Leu Asp Asp Glu Ile Ala Gly Asp Met Ala Gly
    370                 375                 380
Phe Asp Gly Leu Asn Glu Met Ser Pro Val Leu Ala Gly Ile Ala Gly
385                 390                 395                 400
Lys Trp Thr Thr His Pro Tyr Trp Asp Arg Ala Val Leu Asp Ala Leu
                405                 410                 415
Val Ser Leu Glu Pro Gly Leu Lys Arg Arg Arg Gly Thr Asp Lys Trp
            420                 425                 430
Val Leu Arg Gln Ala Leu Ser Gly Leu Leu Pro Ala Glu Thr Val Ala
         435                 440                 445
Arg Pro Lys Leu Gly Ile His Glu Gly Ser Gly Thr Thr Ser Ala Trp
    450                 455                 460
Thr Gly Leu Leu Leu Ala Glu Gly Ile Arg Arg Asp Glu Val Thr Ala
465                 470                 475                 480
Val Lys Gly Ala Met Ala Arg Arg Leu Tyr Asp Ala Val Val Ile Asp
                485                 490                 495
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Thr Val Pro Pro Glu Asp Val Asp Phe Gly Glu Thr Val Arg Arg Ser
        500                 505                 510
Val Asp Ala Val Arg Arg Leu Arg Leu Gln Gly Arg Val Val Val
        515                 520                 525
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        <211> 555
        <212> PRT
        <213> Streptomyces clavuligerus

        <400> 26
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Gly Val Asp His Val Phe Gly Val Val Gly Arg Glu Ala Ser Ala Ile
        20              25              30
Leu Phe Asp Glu Val Glu Gly Leu Asp Phe Val Leu Thr Arg His Glu
        35              40              45
Phe Thr Ala Gly Val Met Ala Asp Val Leu Ala Arg Ile Thr Asn Arg
    50              55              60
Pro Gln Ala Cys Phe Ala Thr Leu Gly Pro Gly Met Thr Asn Leu Ala
65              70              75              80
Thr Gly Val Ala Thr Ser Ala Leu Asp Arg Ser Ser Val Ile Ala Leu
            85              90              95
Ala Ala Gln Ser Glu Ser Tyr Asp Cys Tyr Pro Asn Val Thr His Gln
            100             105             110
Cys Leu Asp Ser Thr Ala Val Met Gly Pro Leu Thr Lys Phe Ser Val
        115             120             125
Gln Leu Glu Arg Gly Glu Asp Ile Val Asn Leu Val Asp Ser Ala Val
        130             135             140
Leu Asn Ser Arg Ile Glu Pro Val Gly Pro Ser Phe Ile Ser Leu Pro
145             150             155             160
Val Asp Leu Leu Gly Ala Glu Leu Asn Gly Thr Pro Thr Asp Ala Pro
            165             170             175
Leu Val Arg Ala Thr Ala Thr His Ala Leu Asp Ala Asp Trp Arg Ala
        180             185             190
Arg Leu Asp Glu Ala Ala Glu Leu Val Arg Glu Ala Glu Asn Pro Leu
        195             200             205
Leu Val Gly Ser Ala Val Ile Arg Ala Gly Ala Val Asp Ala Leu
    210             215             220
Arg Ala Leu Ala Glu Arg Leu Asn Ile Pro Val Val Thr Thr Tyr Thr
225             230             235             240
Ala Lys Gly Val Leu Pro His Asp His Pro Leu Asn Tyr Gly Ala Ile
            245             250             255
Ser Gly Tyr Met Asp Gly Ile Leu Gly His Pro Ala Leu Asp Glu Ile
        260             265             270
Phe Gly Pro Ala Asp Leu Leu Leu Ala Ile Gly Tyr Asp Tyr Ala Glu
        275             280             285
Asp Leu Arg Pro Ser Met Trp Thr Arg Gly Arg Ala Lys Thr Thr Val
        290             295             300
Arg Val Ala Pro Glu Val Asn Pro Ile Pro Glu Leu Phe Arg Ala Asp
305             310             315             320
Ile Asp Ile Val Thr Asn Val Ala Glu Phe Val Thr Ala Leu Asp Asp
            325             330             335
Ala Thr Ser Gly Leu Ala Pro Lys Thr Arg His Asp Leu Ser Ala Leu
            340             345             350
Arg Ala Arg Val Ala Glu Phe Leu Ala Asp Pro Thr Glu Tyr Glu Asp
        355             360             365
Gly Met Arg Val His Gln Val Ile Asp Cys Met Asn Ser Val Leu Asp
        370             375             380
Asn Gly Thr Phe Val Ser Asp Ile Gly Phe Phe Arg His Tyr Gly Val
385             390             395             400
Leu Phe Ala Lys Ser Asp Gln Pro Tyr Gly Phe Leu Thr Ser Ala Gly
            405             410             415
Cys Ser Ser Phe Gly Tyr Gly Leu Pro Ala Ala Met Ala Ala Gln Ile
            420             425             430
Ala Arg Pro Gly Glu Pro Val Phe Leu Ile Ala Gly Asp Gly Gly Phe
        435             440             445
His Ser Asn Ser Ala Asp Ile Glu Thr Ala Val Arg Leu Gly Leu Pro
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          450                       455                   460
Ile Val Met Val Val Val Asn Asn Asp Arg Asn Gly Leu Ile Glu Leu
465                       470                   475                   480
Tyr Gln Asn Leu Gly His Gln Arg Ser His Ala Pro Ala Val Gly Phe
                  485                   490                   495
Gly Ser Val Asp Phe Val Gln Leu Ala Glu Ala Asn Gly Cys Glu Ala
                  500                   505                   510
Val Arg Ala Thr Asp Arg Thr Ser Leu Leu Ala Ala Leu Thr Lys Gly
          515                   520                   525
Ala Gly Leu Gly Arg Pro Phe Leu Ile Glu Val Pro Val Ala Tyr Asp
          530                   535                   540
Phe Gln Ser Gly Gly Phe Ala Ala Leu Ala Ile
545                   550                   555
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